

National Convective Weather Forecast Product, Version 2 (NCWF-2)

Part I - Mission Connection

Product Description

NCWF-2 will assist dispatchers and traffic flow managers in their planning and provide greater efficiency during periods of convective weather within the National Airspace System (NAS). Although NCWF-2 does not yet replace the regulatory guidance provided by the Convective SIGMET, it does provide a valuable supplement for the Convective SIGMET. It is expected that NCWF-2 will replace the NCWF-1 product at some point. NCWF-2 introduces the concept of probabilistic risk that convection will affect certain airspace. Users must understand how to use the product and its probabilistic forecast before it can become an operational product. NCWF-2 is also expected to show an improvement in forecast reliability compared to NCWF-1 with the introduction of new science. NCWF-2 provides an incremental two-hour forecast of convection compared to the one-hour forecast limit of the NCWF-1 product. When used in conjunction with the Collaborative Convective Forecast Product (CCFP), convection forecast continuity would be achieved out to six hours from the current time. The Convective Weather Product Development Team, sponsored by the Federal Aviation Administration's Aviation Weather Research Program, developed NCWF-2.

Purpose

This product provides an observation of significant convective activity occurring at the present time, the National Convective Weather Diagnostic (NCWD). It depicts ongoing convective activity using a combination of the Next Generation Radar (NEXRAD) Vertical Integrated Liquid (VIL) product and lightning data to produce a mosaic, which depicts current convective activity. In addition to providing a depiction of current convective activity, NCWF-2 will produce an incremental, two-hour convective weather forecast.

Schedule

NCWF-2 is updated every 5 minutes and is based on the most current radar and cloud-to-ground lightning data available at the time of production.

Audience

NCWF-2 should be used as a supplement to, not as a substitute for, the Convective SIGMETs.

Presentation Format

NCWF-2 output consists of a combination of GRIB and BUFR formatted files. Once the product becomes operational, these files will be made available to the public.

Web Interface

There is no official experimental web site for NCWF-2 at this time.

Feedback Method

The Aviation Weather Center is always seeking to improve the representation of our products based on user feedback. Comments regarding NCWF-2 should be sent to the feedback email address on the web page containing the product. Technical comments for the NCWF-2 product developer may be addressed to:

National Weather Service
NOAA Aviation Weather Center
Attn: Jeremy Gordon
7220 NW 101st Terrace, room 101
Kansas City, MO 64153-2371
Phone: (816) 584-7256
Email: Jeremy.Gordon@noaa.gov

Part II - Technical Description

Technical Overview

NCWF-2 provides one and two-hour probabilistic convective forecasts. The product is updated every five minutes. The probabilities are shown as a field where darker shades indicate lower probability regions and lighter shades indicate higher probability regions. Regions of growth are determined according to Rapid Update Cycle (RUC) data adjusted by radar trending and diurnal considerations. Convection dissipation is trended based on storm area coverage. NCWF-2 high probability regions are primarily the results of extrapolation and area trending.

Product Output

The display format of NCWF-2 will be considerably different from NCWF-1, because the latter is a direct forecast of convection and the former is a probabilistic forecast of convection. For operational product transmission purposes, NCWF-2 will be communicated in the GRIB and BUFR international standard formats.

Impact of New Product/Capability on Operations

Users authorized to make planning decisions using NCWF-1 are traffic managers (NAS, approach/departure and air route) and airline dispatchers. Even though users find the existing NCWF-1 somewhat useful as a direct forecast of convection, they are cognizant of inherent product reliability problems. Such problems compromise the full potential of the product as a contributor to planning decisions. It is anticipated that NCWF-2 will help overcome these limitations. However, differences in the use of probabilistic forecast tools such as NCWF-2, compared with direct forecasts such as NCWF-1, will have to be documented in detail to avoid potential confusion by the decision maker in how to apply these two forms to decision making.

Several potential benefits are possible when NCWF-2 is operational and used as envisioned. Miles in trail and route selection are the two decisions that will likely be optimized by a more reliable and trustworthy NCWF product. A "reliable 2-hour forecast of convection" means that aircraft moving toward the convective areas but still 800 to 1000 miles away can be

smoothly diverted to safe routes, if necessary, rather than making “last minute” sharp diversions. Ground holds can be minimized if route capacity is optimized.

In order to fully realize this flow optimization potential in convective situations, the traffic flow manager and dispatcher must be provided some guidance on how to use probability forecasting to establish flow/capacity metrics and go/no-go decision making. The documentation and program to train the user is under development. *Any training program that has as an objective the establishment of a relationship between a weather forecast and a specific decision or decision metric must be fully authorized by air traffic control.*

Pilots are authorized to use NCWF-2 as a supplementary product to the Convective SIGMET. The latter remains the official regulatory guidance product issued by the National Weather Service.

Addressing Legacy Shortfalls

There are several improvements in NCWF-2 over NCWF-1:

- Provides a forecast for small storms “missed” by NCWF-1 by use of RUC steering flow winds
- Provides motion vectors for storms that are greater than 512 sq km and have a history of at least 30 minutes
- Overcomes the delay of forecast in NCWF-1 when storms are growing and there is no storm history
- Mitigates forecasts “popping in and out” when the storm area is close to the 512 sq km threshold
- Addresses “noisy” motion vectors noted during times of storm growth and growth by inclusion of more rigorous tracking of motion thresholds. RUC data are used to provide initial motions until storm tracking has stabilized.
- Provides a capability to create a threshold based on change in storm area to help eliminate false motion due to the algorithm’s inability to define and track storm object when the object’s area and shape significantly change
- Provides trending of dissipation based on grids as opposed to total storm area to allow large storm systems to be dissipated in one region and grown in another

Accessibility

NCWF-2 will be available to users as specified below:

- En route traffic managers—(1) ETMS situational displays via CDMNet, (2) WARP Briefing Terminal and (3) Internet access to operational products at AWC via FTP server
- Terminal traffic managers—same as (1) and (3) for en route traffic managers except at locations that have an ITWS, in which case the user would like use the TCWF product
- AOC dispatch offices—internal situational displays via CDMNet
- Pilots—(1) Internet access operational products at AWC via FTP server, (2) pilot self briefing terminal at AFSSs and (3) DUATS
- Flight service specialists—(1) Internet access operational products at AWC via FTP server, (2) OASIS situational displays

Relationship to Other Domestic or International Products

The NCWF-2 product is not related to any international products. NCWF-2 is not a potential replacement for the Convective SIGMET as regulatory guidance because it is not a direct forecast of convection.

Replacements and Changes

NCWF-2 should not replace NCWF-1 and will not replace the Convective SIGMET.

Limitations

NCWF-2 is limited in its usage by the fact that the relationships between traffic flow decisions and/or decision metrics have not been developed. Studies to fully validate its reliability have not been completed. An assessment to ascertain user acceptance has not been initiated as yet.

Regulatory Impact

There are no immediate plans to make regulatory changes or to impact existing regulations when NCWF-2 is operational.

Current Status

NCWF-2 is currently running experimentally at the Aviation Weather Center in Kansas City, MO. The product is expected to be approved by the AWTT board for D4 (operational implementation) in May 2006. Example output files (in GRIB and BUFR format) are available upon request to the technical contact listed above.